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Although games are not usually thought of as aids to planning, a special type of game can be helpful when problems are complex, factors determining resolution are imperfectly understood, and numerous views coexist. Objectives of the education system planning game are to illuminate major issues of educational planning, to increase the participants' awareness of the costs and benefits of alternative plans, and to stimulate an exchange of ideas concerning diverse approaches to education. The game is played by five teams. Two educator teams represent several levels of the educational establishment ranging from elementary school teachers to the U.S. Commissioner of Education. Their responsibility is to devise two separate plans within a fixed budget. A pair of student teams, representing advantaged and disadvantaged student populations, must choose one of the plans and estimate its impact on their achievement as measured by increased number of graduates and quality. A "reality daemons" team personifies social problems related to educational planning. They eliminate all implausible gains estimated by student teams and deduct for counterproductive side effects. Winners are the educator team with the most productive plan, the student team making the greatest achievement, and the "daemon" with the most objections. (TT)

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AN EDUCATION SYSTEM PLANNING GAME

Clark C. Abt

Games are not usually thought of as aids to planning. But when the problem is complex, the factors determining resolution are not precisely understood, and numerous divergent views coexist, a special type of game can be helpful. This kind of game might also be called a human player simulation of the planning, programming, and budgeting process. What makes it a game is the competition between planning teams for maximum achievement of given objectives, and the uncertainty of the outcome of this competition.*

The education system planning game described below was played by the participants in the Conference on Educational Innovations held at Lake Arrowhead, California, on December 19, 1965. Its objectives were to illuminate some of the major issues of education planning, to excite an increased awareness in the participants of some of the alternative plans and their costs and benefits, and to stimulate a problem-focused exchange of ideas among players of diverse approaches to education.

Unlike the Delphi procedure for achieving a concensus or clear split of experts on the time of a given set of future possibilities in the planning game, the general timing and the problem is what is given, and the players generate the competing alternative solutions.

There are five teams of players: Two Educator Teams, two Student Teams, and one Team of 'Reality Daemons'. The Educator Teams include roles representing several levels of the educational establishment, ranging from high school teachers through city school superintendents to the U.S. Commissioner of Education. The Student Teams are of two types: An advantaged population of elementary, high school, college, and adult students; and a corresponding disadvantaged study population. The 'Reality Daemons' Team includes roles personifying various social problems related to education planning, such as economic productivity, political participation, social conflict reduction, etc. (See Player Roles, below.)

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*In the Lake Arrowhead Education Planning Game, the outcome was in fact something of a cliff-hanger.

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PLAYER ROLES IN EDUCATIONAL PLANNING SIMULATION

Educator Team A

A1. Federal Commissioner of Education

A2. State Commissioner of Education

A3. Board of Education Chairman

A4. City School Superintendent

A5. Elementary School Principal

A6. Elementary School Teacher

A7. High School Principal

A8. High School Teacher

A9. University President

A10. University Professor

Students Team A

A1. Advantaged Elementary Students

A2. Advantaged High School Students

A3. Private University Students

A4. Adults with college degrees

Reality Daemons 1-8

1. Educational Establishment
2. Public Opinion Acceptance
3. Economic Productivity
4. Intellectual Creativity
5. Psychological Satisfaction
6. Regional Upgrading
7. Political Participation
8. Social Conflict Reduction

Educator Team B

B1. Federal Commissioner of Education

B2. State Commissioner of Education

B3. Board of Education Chairman

B4. City School Superintendent

B5. Elementary School Principal

B6. Elementary School Teacher

B7. High School Principal

B8. High School Teacher

B9. University President

B10. University Professor

Students Team B

B1. Disadvantaged Elementary Students

B2. Disadvantaged High School Students

B3. State University Students

B4. Adults without college degrees

Note: Roles A2, B2, A3, B3, A9, B9, and A10, B10 may be eliminated if an insufficient number of players is available.

The objectives of these five teams are designed to exercise either their education system planning skills (Educator Teams), education evaluation skills (Student Teams and Reality Daemons), and the identification of important obstacles and problems. Thus, the winning Educator Team is the one that achieves the greatest educational product, in terms of both quantity and quality, within a given budget. The team objectives are summarized below. Note that all the game objectives are also important functional objectives of any substantial education system planning and programming effort.

EDUCATIONAL PLANNING SIMULATION TEAM OBJECTIVES

Educator Teams A & B

Achievement within a given fixed total budget of the greatest 'net educational product' within constraints imposed by the student populations and the 'reality daemons'. 'Net educational product' is arbitrarily defined as the number of graduates of elementary, secondary, and university schools weighted by their 'quality'. The quality will be determined by the averaged evaluations of each of the 'reality daemons, measured on a 10-point scale. Teams A and B compete by means of their plans for the highest net educational product score.

Student Teams A & B

Achievement of the greatest 'net educational product', improvement as a result of the implementation of Educator Team A's or B's plan. Improvement will be measured by the ratio of net educational product following implementation of an Educator Team's plan, to initial net educational product. Teams A and B (advantaged and disadvantaged students, respectively) compete by means of their responses to Educator plans A or B for the greatest improvement in net educational product.

Reality Daemons 1-8

Identification of the largest possible number of realistic objections or implausibilities in the 'gross educational product' output of the Student teams resulting from the Educator teams input plans. The Reality Daemons compete with one another by seeking to be the principal source of reductions in gross educational product to net educational product. In this game, reality is actively malevolent, and the reality daemon realistically disallowing the most gross educational product wins. To discourage arbitrary and unrealistic disallowances, and to obtain a record of such disallowances useful for post-game analysis, all disallowances will be justified by a one page written argument.

The sequence of simulated activities is as follows: In the first hour, the Educator Teams formulate their plans under the needling of the Reality Daemons. This needling takes the form of inputs of troublesome social and educational problems that must be dealt with by the educator-planners, who have initiated their planning efforts with only a few 'reality problems' supplied by a scenario. The formal product of this planning session is a filled-in planning form (see below) with back-up explanations. These constitute the team's National Education Plan.

At the same time, the 'Reality Daemons' give the Student Teams related social and educational problems, but from a more personal point of view. The Student Teams will use these problem inputs to prepare a set of criteria for estimating their responses to the national education plans they receive in the second hour.

At the end of the first hour, both Educator Teams submit each of their National Education Plans to both Student Teams for evaluation, selection, and response estimation. During the second hour each of the two Student Teams -- one advantaged, the other disadvantaged -- evaluate the two competing National Education Plans, in terms of the specific population intervals represented by the players (as briefed for their roles by the microscenarios below). Each Student Team chooses one of the plans for implementation (they may both choose the same plan), on the basis of its apparent educational contribution to their respective populations. Each Student Team then estimates the impact of the plan on its population, on the basis of improved quantity and quality of educated individuals.

At the end of the second hour, both Student Teams have completed estimates of the gross Educational Product (GEP) improvement resulting from the National Education Plans they have selected. These GEP estimates are then submitted to the Reality Daemons, who play a critical 'filtering' role and eliminate or adjust implausible claims for improved GEP, thus producing a Net Educational Product (NEP). The largest NEP wins. (See Sequence of Activities and Team starting instructions below).

EDUCATION SYSTEM PLANNING FORM

		Education System Components			
		Curricula	Teachers	Media & Equipment	Facilities
Advantaged	Elementary (K-8)				
	High School (9-12)				
	Private University				
	Adults with college degrees				
Disadvantaged	Elementary (K-8)				
	High School (9-12)				
	State University				
	Adults without college degrees				

Student Team Microscenarios

(Role descriptions for players)

Advantaged Student Team:

You represent the elementary population of the urban and suburban middle class. Family income ranges from $6000 to $20,000 per year, with a median income of about $10,000. Most students have at least one parent who completed college. Almost all heads of families are white, American-born, and employed.

You represent the high school population of the urban and suburban middle class. Family income ranges from $6000 to $20,000 per year, with a median income of about $10,000. Most students have at least one parent who completed college. Almost all heads of families are white, American-born, and employed.

You represent the private university school population of the urban and suburban middle class. Family income ranges from $6000 to $20,000 per year, with a median income of about $10,000. Most students have at least one parent who completed college. Almost all heads of families are white, American-born, and employed.

Disadvantaged Student Team:

You represent the elementary school population of the urban disadvantaged. Family incomes are mostly under $6000 per year. More than half are Negro or Puerto-Rican. Many heads of families are women with part-time jobs, and most heads of families have not attended college. Many high school students must work at least part-time to support their families.

You represent the elementary population of the rural disadvantaged. Most family incomes are less than $4000 per year. Most parents have not finished high school. Many are Negroes, Mexicans, or Indians. Most parents are small farmers, agricultural workers, or miners, and families are large.

You represent the high school population of the rural disadvantaged. Most family incomes are less that $4000 per year. Most parents have not finished high school. Many are Negroes, Mexicans, or Indians. Most parents are small farmers, agricultural workers, or miners, and families are large.

You represent the high school population of the urban disadvantaged. Family incomes are mostly under $6000 per year. More than half are Negro or Puerto-Rican. Many heads of families are women with part-time jobs, and most heads of families have not attended college. Many high school students must work at least part-time to support their families.

EDUCATION SYSTEM PLANNING GAME
SEQUENCE OF ACTIVITIES

First Hour	**2 Educator Teams** Each team formulates National Education Plan and budget allocation, using planning form, scenario input, role assignments, and education problems from Reality Daemons.	**2 Student Teams** Each team prepares criteria for evaluating desirability and estimating consequences of alternative plans, based on own population characteristics.	**Reality Daemons Team** Give social and education problems to Educator and Student Teams.
Second Hour	Educator Teams clarify and elaborate on their plans, at the request of the Student Teams for more information.	'Advantaged' and 'Disadvantaged' Student Teams each choose most desirable National Education Plan, estimate improved Gross Educational Product resulting from Plan.	Reality Daemons continue to introduce social pressures and life problems to the two Student Teams.
Third Hour	Educator Teams defend and explain their plans to Reality Daemons 'jury'.	Student Teams defend and explain their GEP estimates to Reality Daemons 'jury'.	Jury of Reality Daemons determine Net Educational Products of competing plans, and on this basis, the 'winning' plan.

NOTE: Heavily outlined activities are the principal arenas of decision-making in the game.

STARTING INSTRUCTIONS TO EDUCATOR TEAMS

Read the Player Roles statement of Team Objectives and the 3 x 3 table, Player Sequence of Activities. Examine the blank Education System Planning Form. Your team has one hour to complete this Planning Form and 1/2 page of written backup explanations for each of the 32 budget and descriptive categories (e.g., "Disadvantaged--High School -- Facilities"). The completed Planning Form and backup explanations constitute your team's National Education Plan, and is immediately submitted at the end of the hour to the two hour Student Population Teams. The Student Teams also receive a competing National Education Plan from your competitor, the other Educator Team. If at least one of the Student Teams chooses your team's plan, and if it 'performs' better than the other plan in terms of Net Educational Product (NEP) in the evaluation by the 'Reality Daemons,' your team 'wins.'

To give you a basis for beginning the planning effort at once, assume the current (1965) state of U.S. education and its attendant problems. There are pockets of poverty, racial tensions, rising crime rates, and backward regions. A budget will be given to you, for each of the four education system components, based on the DELPHI Procedure. This is a guide which you may modify in individual components, but the total must remain the same. Remember, however, that you have only one hour, and must describe each of the 32 budget categories on the table substantively in a 1/2-page handwritten explanation.

To speed your planning effort, the player in the role of Federal Commissioner of Education will act as team chairman and make all final decisions on choices. It is suggested that one way to assure completion of your plan in time is to divide the labor by assigning players in specific roles to specific planning functions (e.g., high school principal to planning high school curricula, teachers, equipment, and facilities).

STARTING INSTRUCTIONS TO STUDENT TEAMS

Read your pink or blue student Population Scenarios, the Player Roles, Team Objectives, Player Sequence of Activities table, and Education System Planning Form. Your team will receive two competing National Education Plans from the two Educator Teams at the end of the first hour, consisting of the completed Planning Form and about 15 pages of written description of each of the 32 budget categories, (such as "Disadvantaged-Elementary-Curricula"). Your problem is to evaluate the two competing plans in terms of what they do for your populations in terms of Gross Educational Product (numbers of graduates of various levels x quality). Selection of the most desirable plan must be by majority vote in your team. After selecting what appears to be the most desirable plan for your particular mix of student populations, write a two-page description of the improvement in Gross Educational Product (GEP) you expect as a result of the implementation of the selected National Education Plan. Your estimate of the improved GEP must be completed at the end of the second hour and submitted to the 'Reality Daemons' for their evaluation. They will reduce your expectations by eliminating what they consider implausible or impractical, and determine a Net Educational Product (NEP). If your team's improvement in NEP is greater than that of the other student team, your team 'wins.'

During the first hour while waiting for the National Education Plans to be submitted, you will be receiving various life problems from the Reality Daemons. Try to imagine and note down how your particular segment of the student population reacts to these problems in the current educational context so that when you see the new plan you may more readily estimate its effects on your population.

STARTING INSTRUCTIONS FOR REALITY DAEMONS

Read the list of Player Roles, Team Objectives, table of Player Sequence of Activities, and Education System Planning Form. While the Educator Teams are formulating their plans during the first hour, it is your function to generate realistic social problems in one-half page written statements to give to them, to respond to by their plans. You should begin to submit these after the first 20 minutes. (The Education Teams were given some initial 'reality problems' by the referee, but will need more after 20 minutes.)

After the first 30 minutes, you should begin to generate reality problems for the Student Teams, in their terms. These should be submitted as one-half page written statements to the Student Teams as soon as they are thought of.

At the end of the second hour, the Student Teams will have selected their Preferred Education System Plans and made written estimates of the improvement in Gross Educational Product resulting from implementation of these plans. These written estimates will be submitted to you, for your critical 'filtering'. After you eliminate all those expected gains that you consider implausible and deduct for counter-productive side effects, and write one-page explanations of these eliminations, the resultingly reduced Gross Educational Product will be what we call the Net Educational Product (NEP). The largest NEP 'wins'. The Reality Daemon producing the largest number of realistic objections justified by one-page explanation also 'wins'.

In the education system planning game played at the Lake Arrowhead conference on educational innovations, the two Educator Teams developed quite different National Education Plans. Educator Team A, which included a real world United States Assistant Commissioner of Education, allocated most of its $10 billion budget to training additional teachers for elementary and secondary schools in disadvantaged areas. Team B, which included a real world Director of Manpower Studies of the National Science Foundation, distributed its $10 billion budget much more broadly, across both advantaged and disadvantaged populations, and for facilities and equipment as well as for more teachers and more teacher training.

As might be expected, the Advantaged Student Team chose the latter (Team B's) Plan, while the Disadvantaged Student Team chose Plan A since this particularly favored its population. Neither Student Team was really happy with either plan, finding many gaps in planning that could only partly be corrected by direct consultation with the Eductor Team planners. However, given the need to adopt one or the other plan, they chose realistically according to their own best interests. If more time had been available (days rather than hours), the Student Teams might have rejected both plans and insisted on the Educator Teams repeating their efforts and formulating more satisfactory plans.

The Reality Daemon Jury evaluating the GEP estimates submitted by the two Student Teams considerably reduced these GEP's to NEP's.* They then estimated the increased number of high school graduates each plan would produce -- Plan A was a clear winner here, with its emphasis on teachers for disadvantaged schools with previously high dropout rates. The quantity of graduates then had to be weighted by their estimated increased educational quality. Plan B, with its more balanced distribution of education system improvements, clearly produced a better average quality improvement. However, the qualitative superiority of Plan B was just barely insufficient to overcome the

*GEP = Gross Educational Product, NEW = Net Educational Product.

quantitative superiority of Plan A, according to the relative weightings given quantity and quality of educational output by the Reality Daemons. Thus Plan A won.

While the actual plans produced by this particular abbreviated game were much too aggregated to be directly useful, the issues exercised and the apparent consequences of budgetary allocation decisions offered a dramatic and intensive problem-solving experience to the participants. The game motivated a much more problem-focused and solution-stimulating activity than had a general discussion of the same planning problems. The participants, through role playing and the required making of joint decisions, were stimulated to produce more issues, arguments, and plans than they had been able to do otherwise.

It should be noted that the above experience is readily available to any group of education planners that wish to make the effort. No special equipment, facilities, or skills are required. The above description of the game and instructions, together with at least about twenty serious players who have at least three hours to spend, and three rooms are all that is needed to play this educational game about planning education. The participants found it highly stimulating, enlightening, and rewarding. Hopefully other educators will also make use of the technique.